

# Environmental Flow Basics

## Freshwater Inflow to Matagorda Bay

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# Overview

- Matagorda Bay
- History of changes
- Importance of Freshwater Inflow
  - Nursery
  - Habitat & Focal Species
- Freshwater Inflow Needs Studies
- Matagorda Bay Health Evaluation

# Matagorda Bay

- 2<sup>nd</sup> largest estuary in Texas
- Commercial Fishery
  - Shrimp
  - Crab
  - Oysters
- Recreational Fishery
  - Red Drum, Speckled Trout



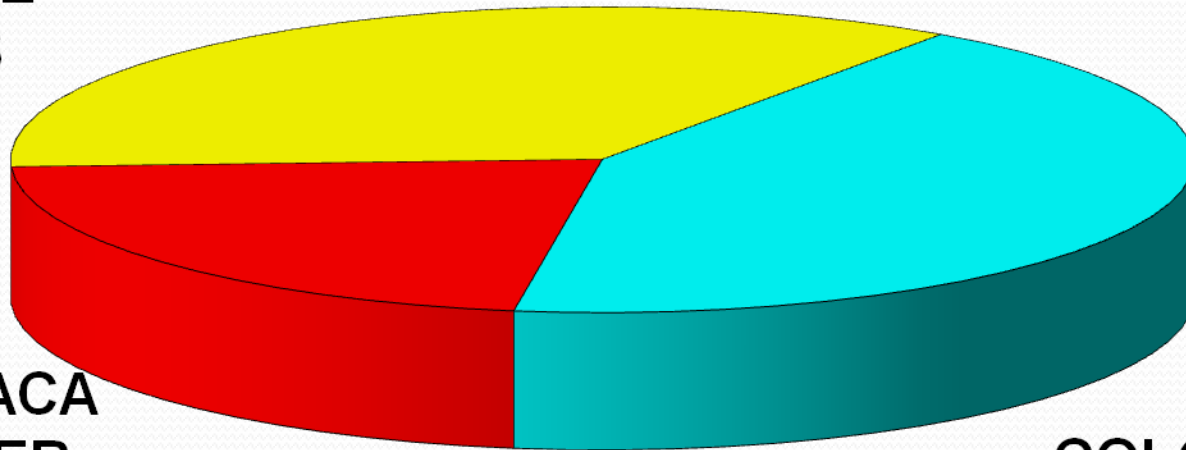
# Sources of Freshwater Inflows to Matagorda Bay

Average Historical Inflow = 2.9 mil. ac-ft/year

COASTAL  
BASINS  
35%

LAVACA  
RIVER  
BASIN  
22%

COLORADO  
RIVER  
BASIN  
44%



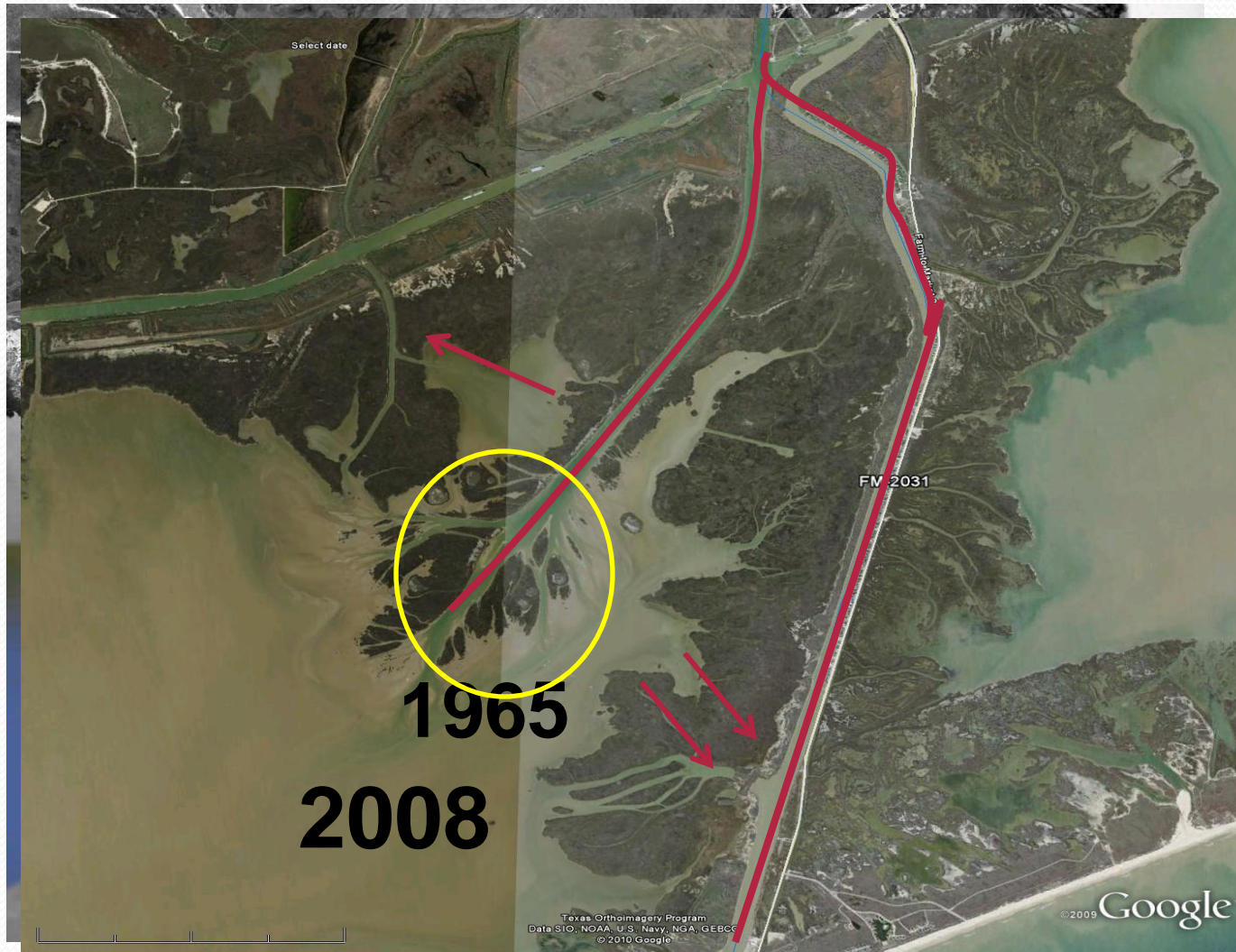
# Importance of Freshwater Inflow

- Estuaries are a nursery for many species
  - Lower salinity than seawater
  - Habitat provides protection from predators
  - Provide nutrients and food
  - Sediments build and nourish habitats
- Timing and Magnitude of inflows are important
  - Many species life cycles are timed to inflows

# History- Colorado

- Pre 1900- no land barrier between East and West Bay
- 1920's- major log jam in river removed
- 1930's- land bridge forms- Colorado River diverted to the Gulf
- 1992-river diverted into the bay

# History



# Habitat



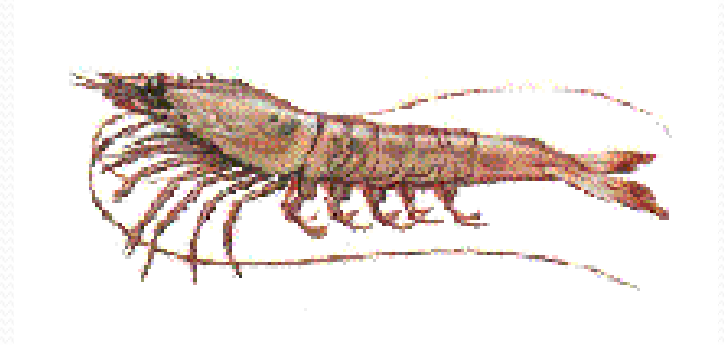
# Focal Species

- Finfish
  - Atlantic Croaker
  - Striped Mullet
  - Gulf Menhaden
  - Black Drum
  - Red Drum
  - Flounder

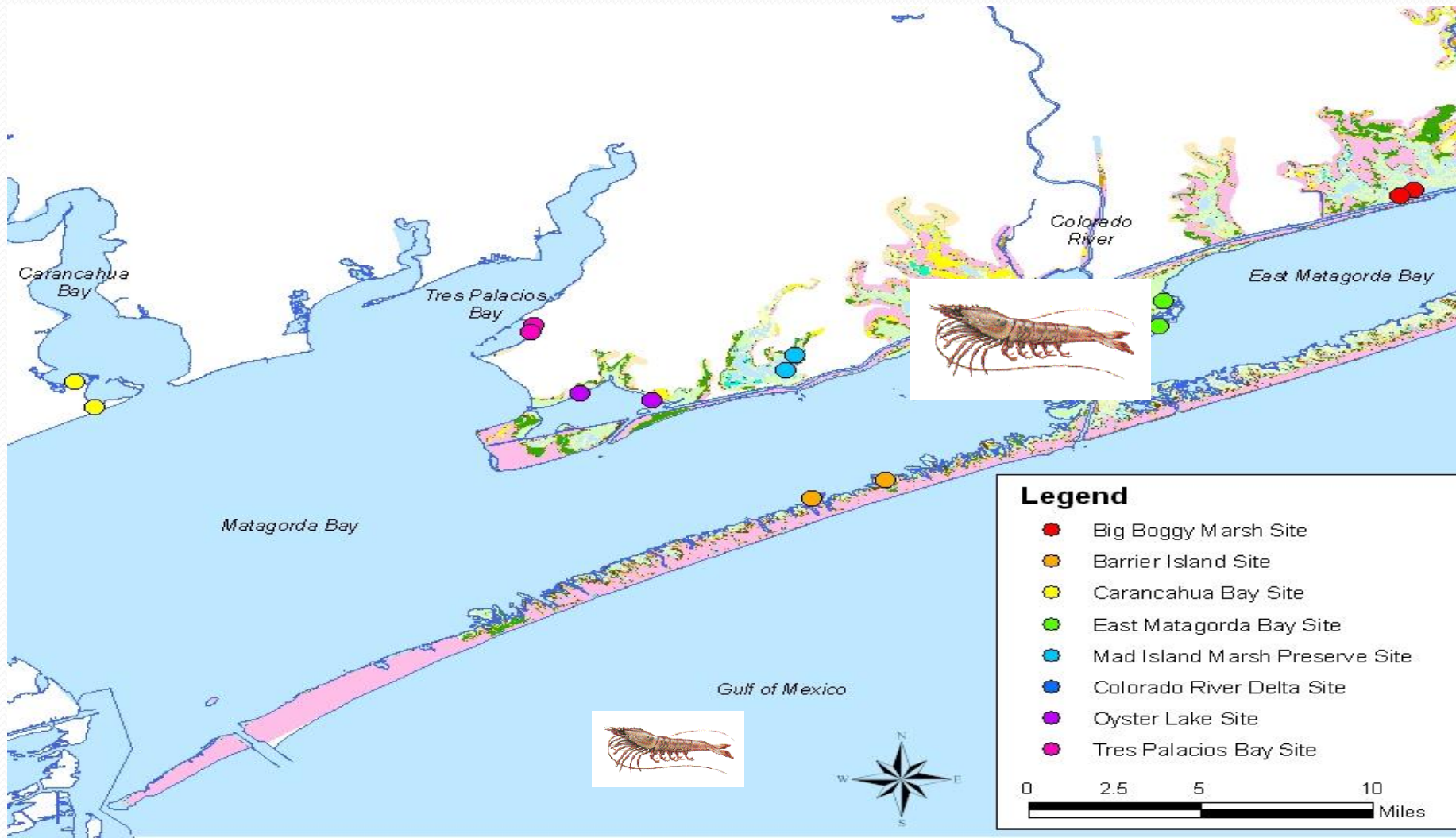


# Focal Species

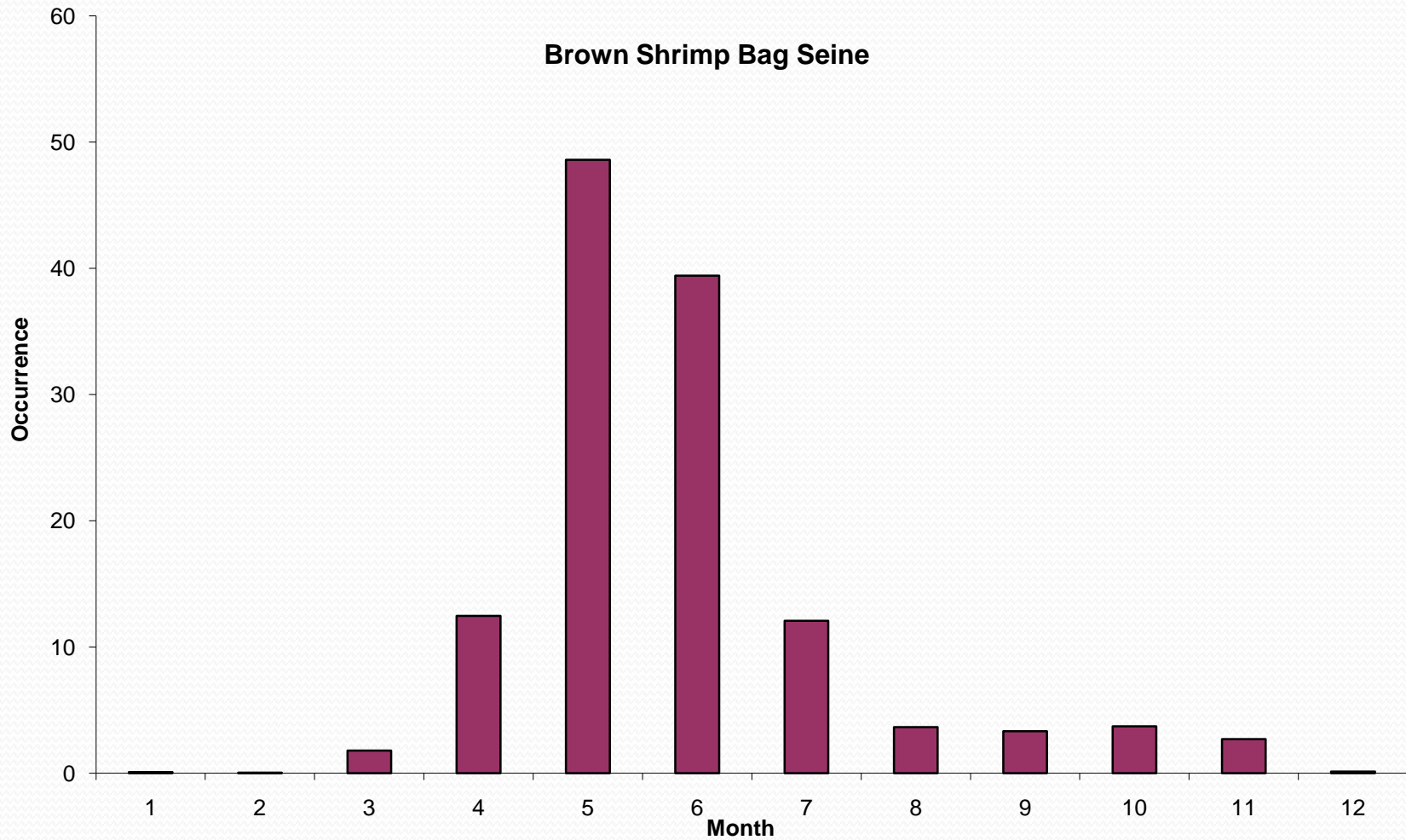
- Shellfish
  - Blue Crab
  - Oysters
  - White Shrimp
  - Brown Shrimp



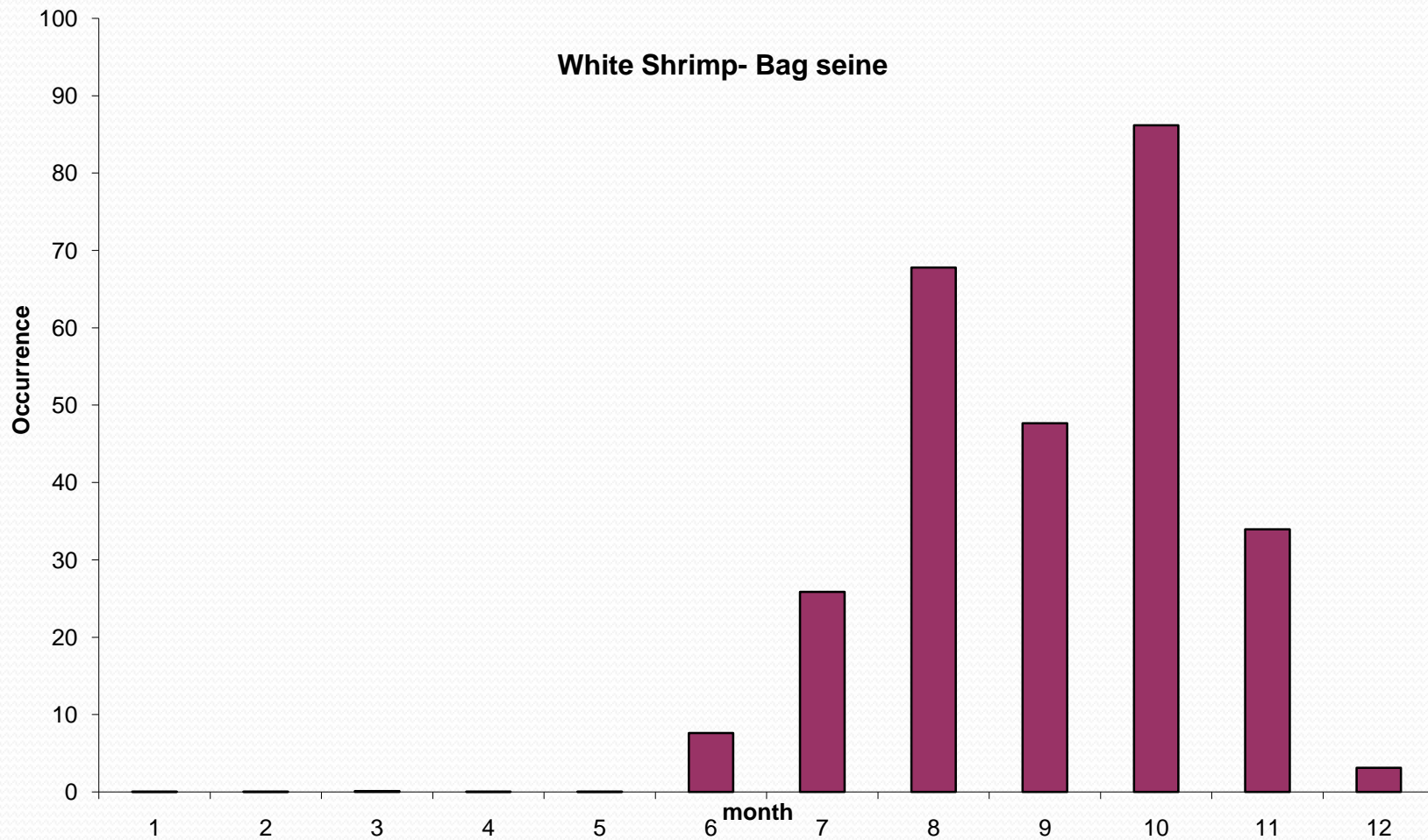
# Migration



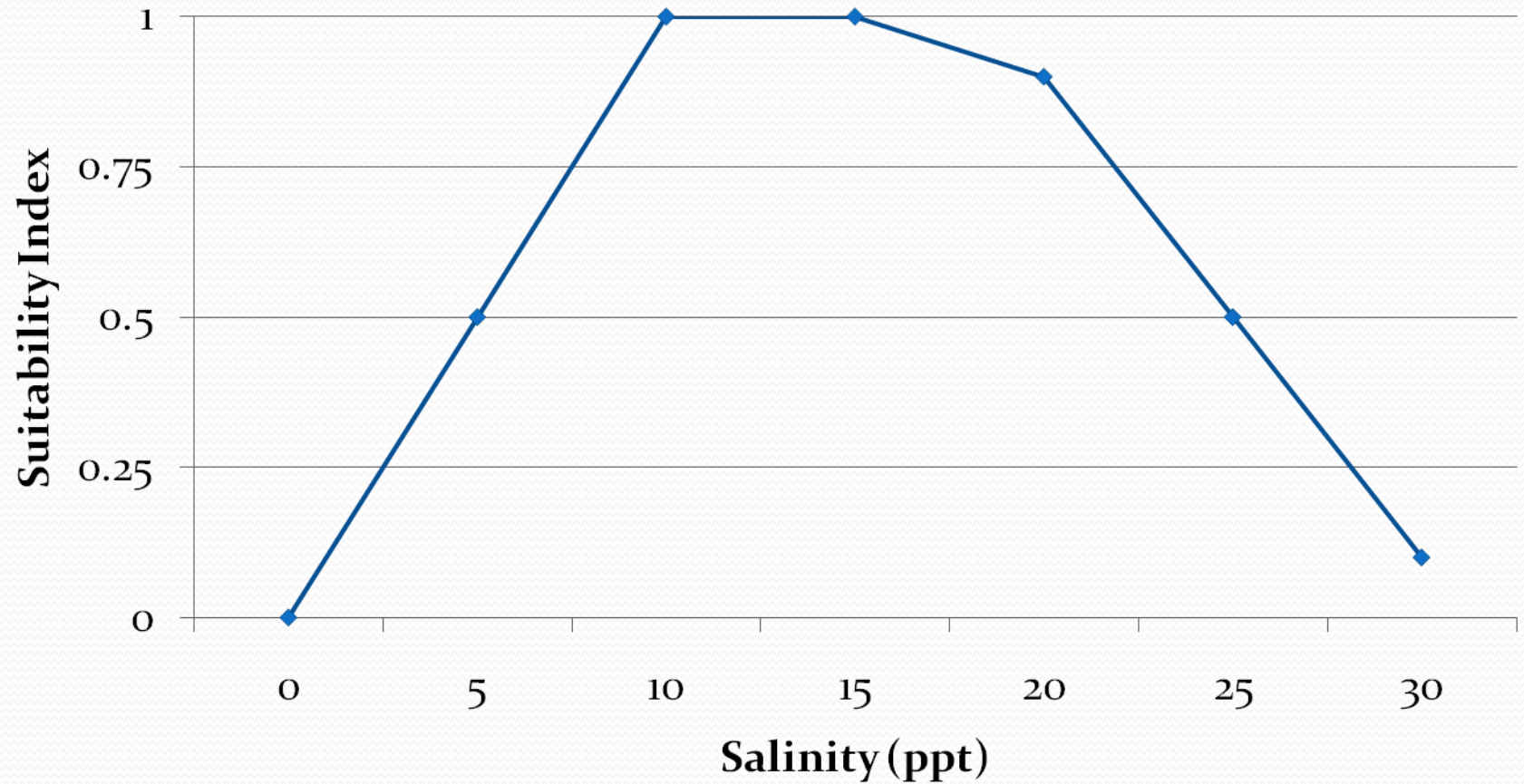
# Seasonality



# Seasonality



# Salinity Suitability – White Shrimp



# Habitat



# Biology Summary

- Inflows create nursery
- Many species use estuary seasonally
- Juveniles of many species have salinity preference
- Oysters depend on freshwater
- The FINS and MBHE incorporate these concepts

# MBHE

- Flow regime focused study
- Hydrology
- Salinity
- Habitat
- Nutrients

# MBHE Inflow Regime

Category	Habitat Condition	Achievement
MBHE 4	Select	35%
MBHE 3	Good - Fair	60%
MBHE 2	Fair - Poor	75%
MBHE 1	Poor	90%
Threshold	Refuge	100%

# Lavaca Bay

- Receives Inflows from many sources
- Lavaca River, Navidad River, Garcitas Creek
  - Cox Creek, Chocolate Bayou, Placedo Creek
- Supports commercial and recreational fishery
- Oysters identified a key species in estuary

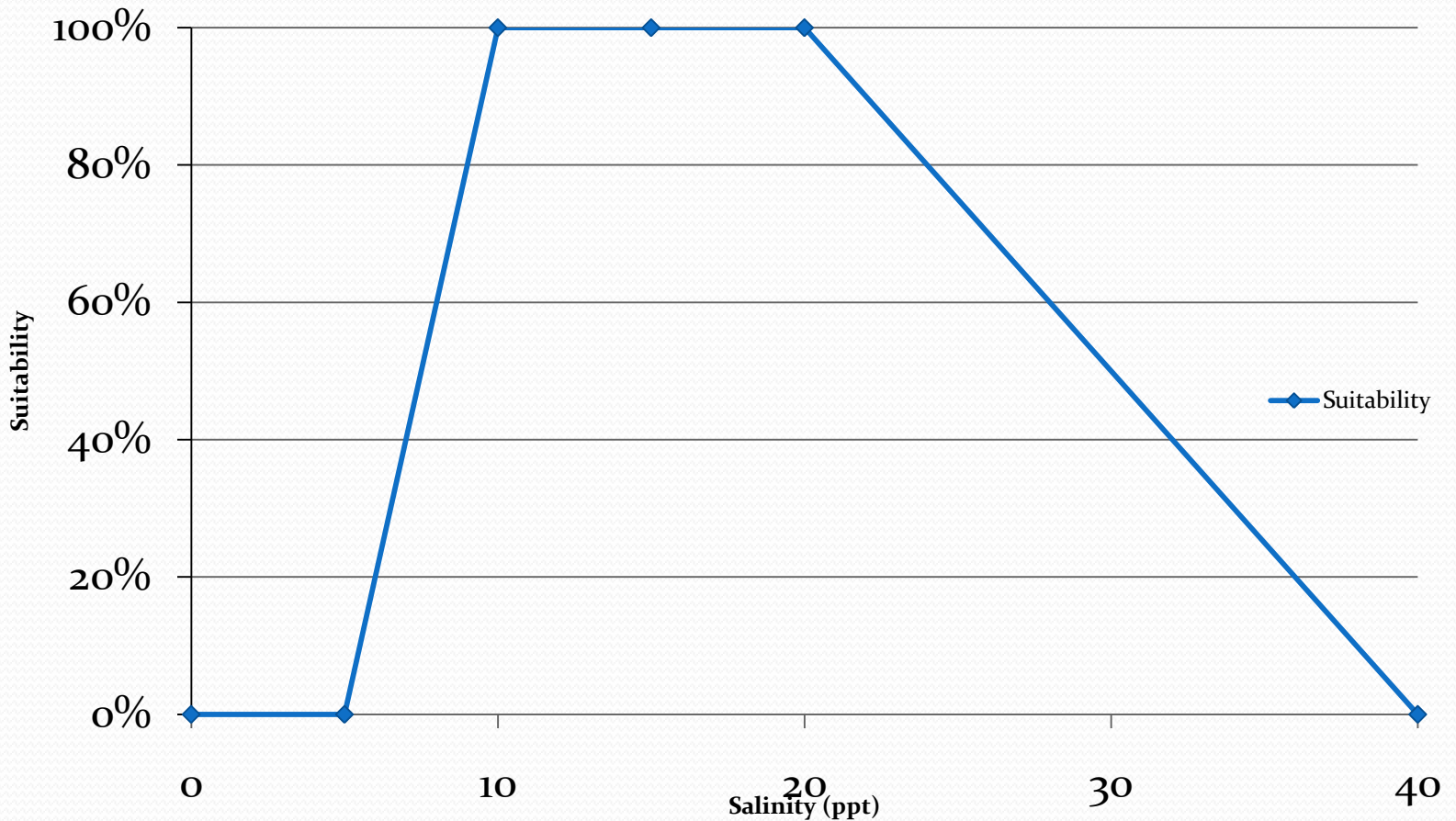
# Oysters

- Keystone estuarine species
- Sensitive to prolonged drought






# Oyster Suitability



# Lavaca Bay Inflow Components

Inflow Components	Description	Salinity (ppt)
Subsistence	Maintain oyster habitat suitability of 50%	$\leq 30$
Base low	Maintain oyster habitat suitability of 75%	$\leq 25$
Base medium	Maintain oyster habitat suitability of 90%	$\leq 22$
Base high	Maintain oyster habitat suitability of 100%	Between 10 and 20



Flow Regime	Total Annual Flow Volume (Acre-Feet)	Achievement Guideline
<b><i>Subsistence</i></b>	30,000	95%
<b><i>Base Low</i></b>	122,400	60%
<b><i>Base Medium</i></b>	284,400	50%
<b><i>Base High</i></b>	496,800	35%